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BATON ROUGE METROPOLITAN AREA AIR POLLUTANT EMISSION INVENTORY

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Environmental Health Service

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29

BIBLIOGRAPHIC DATA SHEET	1. Report No. APTD-0866	2.	3. Recipient's Accession No.	
	4. Title and Subtitle Baton Rouge Metropolitan Area Air Pollutant Emission Inventory		5. Report Date January 1970	
7. Author(s) Alan J. Hoffman		8. Performing Organization Rept. No.		
9. Performing Organization Name and Address U. S. Department of Health, Education, and Welfare National Air Pollution Control Administration Division of Air Quality and Emission Data Durham, North Carolina		10. Project/Task/Work Unit No.		
		11. Contract/Grant No.		
12. Sponsoring Organization Name and Address Same as above		13. Type of Report & Period Covered		
		14.		
15. Supplementary Notes				
16. Abstracts A summary report is presented of the Baton Rouge area air pollutant emission inventory. The study area consists of five parishes along the river extending up to Baton Rouge from New Orleans. The pollutants, which include sulfur oxides, particulates, carbon monoxide, hydrocarbons, and nitrogen oxides are delineated with respect to source type, season of the year and geographical distribution within the area. The general procedure for estimating the surveys is based on the rapid survey technique for estimating air pollutant emissions.				
17. Key Words and Document Analysis. 17a. Descriptors Air pollution Fuels Emission Combustion Inventories Refuse disposal Sulfur oxides Industrial wastes Particles Evaporation Carbon monoxide Hydrocarbons Nitrogen oxides Transportation 17b. Identifiers/Open-Ended Terms Baton Rouge, Louisiana Particulates Stationary sources 17c. COSATI Field/Group 13B				
18. Availability Statement Unlimited		19. Security Class (This Report) UNCLASSIFIED		21. No. of Pages 28
		20. Security Class (This Page) UNCLASSIFIED		22. Price

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Consumer Protection and Environmental Health Service
National Air Pollution Control Administration
Division of Air Quality and Emission Data
Durham, North Carolina
January, 1970

ACKNOWLEDGMENTS

Sincere gratitude is extended by the National Air Pollution Control Administration to the many individuals and companies who contributed to this air pollution emission inventory.

Special thanks are extended to the Louisiana Air Control Commission, Louisiana State Department of Health, who contributed invaluable assistance in the gathering of data for this report.

PREFACE

This report, which presents the emission inventory for the Baton Rouge Metropolitan Area, is another in a series of surveys outlining the sources and emissions of air pollutants for major metropolitan areas in the country. These surveys, conducted by the National Inventory of Air Pollutant Emissions and Control Branch of the National Air Pollution Control Administration, provide estimates of the present levels of air pollutant emissions and status of their control. The pollutants, which include sulfur oxides, particulates, carbon monoxide, hydrocarbons and nitrogen oxides are delineated with respect to source type, season of the year and geographical distribution within the area. The general procedure for the surveys is based upon the rapid survey technique for estimating air pollutant emissions.¹ These reports are intended to serve as aids in the proposing of boundaries of Air Quality Control Regions, as directed by the Air Quality Act of 1967.

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INTRODUCTION

This report is a summary of the Baton Rouge area air pollutant emission inventory conducted in January, 1970. Since all inventories are based upon a calendar year, the data and emission estimates presented are representative of 1968 and should be considered as indicating the conditions as existed during that year.

The Study Area, which was chosen on the basis of the distribution of population and air pollution sources, consists of five parishes along the river extending up to Baton Rouge from New Orleans. This area covers approximately 1,840 square miles and had a 1968 population of 368,000.

Emissions were estimated by using various indicators such as fuel consumption, refuse burning rates, vehicle-miles, production data, and control efficiencies and emission factors relating these indicators to emission rates.² These factors represent average emission rates for a particular source category. Since individual sources have inherent differences that cannot always be taken into consideration, discrepancies between the actual and estimated emissions are more likely in individual sources than in the total emissions for a source category.

As in all emission surveys, the data presented are estimates and should not be interpreted as absolute values. The estimates are, in some cases, partial totals due to the lack of emission factors and production or consumption data. Despite these limitations, these estimates are of sufficient accuracy and validity in defining the extent and distribution of air pollutant emissions in the Study Area.

SUMMARY OF RESULTS

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The estimated annual emissions of the five surveyed pollutants in the Baton Rouge Metropolitan Area are presented in Table 1. The following is a brief summary of emissions and sources.

Sulfur Oxides: The predominant source of the 119,000 tons is industrial processes, which accounts for over 96 percent.

Particulate Matter: The annual emissions of nearly 53,000 tons are emitted primarily by industrial processes (83 percent). The next largest source is solid waste disposal.

Carbon Monoxide: The largest source of the 388,000 tons is industrial processes (51 percent). Motor vehicles account for 42 percent of the total.

Hydrocarbons: Industrial processes again account for the major portion of the total emissions (85 percent). Evaporation and transportation each contribute about 6 percent.

Nitrogen Oxides: Fuel combustion by industry is the largest emitter of this pollutant accounting for over 58 percent of the total. The next largest source is motor vehicles.

TABLE 1 SUMMARY OF AIR POLLUTANT EMISSIONS FOR THE BATON
ROUGE STUDY AREA, 1968 (TONS/YEAR)

Source Category	Sulfur Oxides	Partic- ulates	Carbon Monoxide	Hydro- carbons	Nitrogen Oxides
Transportation					
Motor Vehicles	770	1,300	163,300	12,930	9,450
Other	2,630	1,320	7,400	2,630	3,010
Stationary Fuel Combustion					
Industrial	N	1,700	N	N	41,500
Commercial	N	30	N	N	220
Residential	N	70	N	N	450
Steam-Electric	10	320	N	N	8,370
Solid Waste	290	4,300	20,000	6,330	2,400
Industrial Processes	115,300	43,650	197,400	191,710	4,800
Evaporative Losses	--	--	--	10,520	--
TOTAL	119,000	52,690	388,100	224,120	70,200

N = Negligible

DESCRIPTION OF STUDY AREA

The Study Area for the Baton Rouge Air Pollutant Emission Inventory covers the parishes along the Mississippi River extending up to the New Orleans Region (See Figure 1). The five parishes included in the area are: Ascension, Iberville, St. James and East and West Baton Rouge. Only East Baton Rouge is in a Standard Metropolitan Statistical Area (SMSA) as defined by the Bureau of Budget.

The approximate 1968 population for the Study Area was 368,000. Table 2 presents the population and land area for each parish. It is apparent that East Baton Rouge is the only urbanized parish in the Study Area. However, the other parishes were included because of the heavy industrialization along the River.

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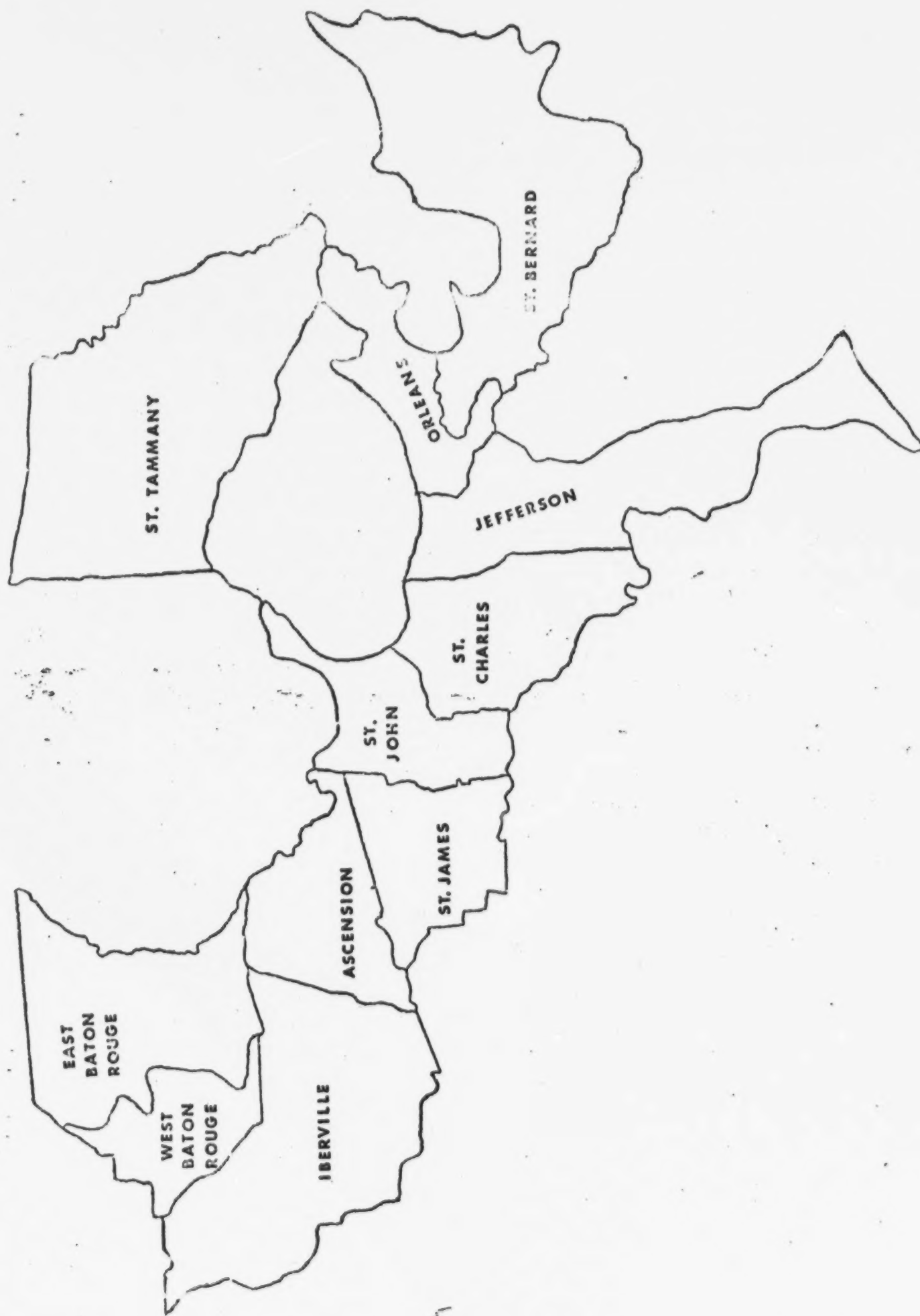


FIGURE 1 BATON ROUGE & NEW ORLEANS STUDY AREAS

TABLE 2 POPULATION AND AREA CHARACTERISTICS FOR THE BATON
ROUGE STUDY AREA, 1968

Jurisdiction	Population		Land Area mi. ²	Population Density 1968
	1960	1968		
Ascension	27,900	32,260	301	107.2
Iberville	29,900	33,860	627	54.0
E. Baton Rouge	230,100	263,220	459	573.5
W. Baton Rouge	14,800	17,280	203	85.1
St. James	18,400	21,440	253	84.7
TOTAL	322,100	368,060	1,843	199.7

EMISSIONS BY SOURCE CATEGORY

TRANSPORTATION

Transportation is the source category concerned with mobile sources of air pollutants. The sources in this category include: road vehicles (both gasoline and diesel powered), aircraft, vessels and railroads.

Road Vehicles

Gasoline consumption by parish was obtained for 1963 and updated to 1968.^{3,4} Vehicle miles of travel were found using an average factor of fuel consumed per vehicle mile.

Approximately 1.5 to 2.0 percent of gasoline is lost through evaporation from gasoline tanks and carburetors. (This is exclusive of exhaust emissions.) Since 1963, most new automobiles were equipped with positive crankcase (PCV) valves that reduce hydrocarbon emissions from the crankcase by about 90 percent. Due to a lag time in the automobile replacement rate, it was assumed that 20 percent of the automobiles were not equipped with PCV valves.

About 5.5 million miles were traveled by motor vehicles each day. In the process, 160 million gallons of gasoline and 9.3 million gallons of diesel fuel were consumed. Table 3 indicates that about 83 percent of all motor vehicle travel occurred in East Baton Rouge Parish.

The resulting emissions from this motor vehicle activity is shown in Table 4. Motor vehicles are by far the most significant transportation source accounting for 96 percent of the carbon monoxide and 80 percent of the hydrocarbons.

Aircraft

The total number of flights by type was obtained from the Federal Aviation Administration.⁵ A flight is defined as a combination of a take-off and landing.

Emissions were obtained by applying the appropriate emission factors to the total number of flights in each engine and type category. Table 4

TABLE 3 GASOLINE CONSUMPTION AND VEHICLE MILES OF TRAVEL
IN THE STUDY AREA, 1968

Jurisdiction	Gasoline		Diesel		Total Vehicle Miles
	10 ³ Gallons	10 ³ Vehicle Miles/Day	10 ³ Gallons	10 ³ Vehicle Miles/Day	
Ascension	9,600	320	570	8	328
Iberville	8,800	295	500	7	302
East Baton Rouge	133,000	4,480	7,730	108	4,588
West Baton Rouge	6,500	220	360	5	225
St. James	2,200	75	140	2	77
TOTAL	160,100	5,390	9,300	130	5,520

TABLE 4 EMISSIONS FROM TRANSPORTATION SOURCES IN THE
STUDY AREA, 1968 (TONS/YEAR)

Source Category	Sulfur Oxides	Partic- ulates	Carbon Monoxide	Hydro- carbons	Nitrogen Oxides
Motor Vehicles					
Gasoline	590	790	163,000	12,300	8,400
Diesel	180	510	280	630	1,050
Evaporation	--	--	--	9,600	--
Trains	80	220	120	280	440
Vessels	2,550	1,000	470	1,020	2,200
Aircraft	N	100	6,800	1,330	370
TOTAL	3,400	2,620	170,700	15,560	12,460

N = Negligible

presents the resulting emissions from the airport in Baton Rouge. Aircraft is a significant source of carbon monoxide only.

Vessels

The number of trips made by vessels on the Mississippi River was obtained from the Baton Rouge and New Orleans Port Commissions. An average quantity of fuel per vessel trip was applied to the total, and an average consumption of fuel while in port was used to determine the quantity of fuel consumed by this user category.

Air pollutant emissions are presented in Table 4. As can be seen, vessels are a significant source of sulfur oxides and particulates.

Trains

The total fuel consumed by railroads in any state is given by the Bureau of Mines' Mineral Industry Surveys.⁶ The portion consumed in the Study Area was found taking the ratio of population of the Study Area to the State times the total state fuel consumption. Table 4, which presents the emissions, shows that railroads are not a significant contribution to any of the five surveyed pollutants.

FUEL COMBUSTION IN STATIONARY SOURCES

Natural gas for all practical purposes is the only fuel consumed in the Study Area for heat and power. Some fuel oil is consumed, but it is of minor usage. In 1968, natural gas accounted for 23×10^{13} BTU's of energy.

Table 5 presents natural gas usage by consumer category. Industry is by far the largest consumer (80 percent). This is due to the fact that many industries operate their own power plants.

TABLE 5 NATURAL GAS CONSUMPTION BY CONSUMER CATEGORY FOR
THE STUDY AREA, 1968 (10^6 Ft.³).

Jurisdiction	Residential	C & I	Industrial	Steam- Electric	Total
Abscension	650	300	42,080	--	43,030
Iberville	700	350	42,200	28,860	72,110
East Baton Rouge	5,600	2,800	109,660	14,000	132,060
West Baton Rouge	330	150	1,000	--	1,480
St. James	370	150	27,670	--	28,190
TOTAL	7,650	3,750	222,610	42,860	276,870

The resulting emissions are shown in Table: 1. Natural gas combustion is a significant source of nitrogen oxides.

NOT REPRODUCIBLE

SOLID WASTE

The total solid waste generated within the Study Area was found by applying the national average per capita generation rate to the total resident population. This generation rate includes both collected and uncollected waste. On the average, 4.5 lb/day is collected by municipalities for public disposal in the area. This figure includes household, commercial, and industrial refuse. Another 4.5 lb/day (uncollected waste) includes industry (3.0 lb/day) and commercial and other household (1.5 lb/day).

The disposal methods of the collected waste were found from a survey by the Louisiana Health Department. For the uncollected waste national averages of disposal method quantities were applied to the total generated.

Table 6, which is a solid waste balance for the Study Area, shows the results of the above methodology, while Table 7 presents the emission estimates.

INDUSTRIAL PROCESSES

The major industries in the Study Area are in the manufacture of chemicals and petroleum products. Table 8 presents the emissions from the large industries in the Study Area. Time did not allow for a survey of all industry. However, all the large sources along the Mississippi River were surveyed.

EVAPORATIVE LOSSES

The sources of solvent evaporation considered in this survey were industry, dry cleaning and motor vehicles. Industrial evaporation was found from individual source information. Dry cleaning emissions were calculated using a per capita rate of 5.0 lb/year. Emissions from motor vehicles were broken down into exhaust and crankcase and carburetor. Over 22,000 tons were emitted from these sources in the Study Area during 1968.

TABLE 6 SOLID WASTE BALANCE FOR THE BATON ROUGE STUDY
AREA, 1968 (TONS/YEAR)

NOT REPRODUCIBLE

Jurisdiction	Waste Generated	Open Burning On-Site	Dumps	On-Site Incineration
Ascension	50,000	12,000	25,000	13,000
Iberville	50,000	17,000	15,000	18,000
East Baton Rouge	430,000	115,000	200,000	115,000
West Baton Rouge	20,000	7,000	6,000	7,000
St. James	30,000	13,000	4,000	13,000
TOTAL	580,000	164,000	250,000	166,000

TABLE 7 EMISSIONS FROM SOLID WASTE DISPOSAL FOR THE STUDY
AREA, 1968 (TONS/YEAR)

Source Category	Sulfur Oxides	Partic- ulates	Carbon Monoxide	Hydro- carbons	Nitrogen Oxides
Open Burning	210	3,300	17,600	6,200	2,250
Incineration	80	1,000	2,400	130	150
TOTAL	290	4,300	20,000	6,330	2,400

TABLE 3 EMISSIONS FROM SELECTED INDUSTRIAL PROCESSES
1968 (TONS/YEAR)

Source Category	Sulfur Oxides	Partic- ulates	Carbon Monoxide	Hydro- carbons	Nitrogen Oxides
Oil Refineries	74,000	6,000	192,800	64,600	4,800
Chemicals	40,200	8,350	4,600	127,110	--
Grain	--	4,200	--	--	--
Cement	--	2,500	--	--	--
Metals	300	19,100	--	--	--
Other	800	3,500	--	--	--
TOTAL	115,300	43,650	197,400	190,710	4,800

EMISSIONS BY JURISDICTION

The previous section of this report presents emissions primarily by source category. The emissions by parish and source are summarized here in Tables 9 through 13.

East Baton Rouge and Iberville Parishes are highest in emissions. This is due to the urbanization in East Baton Rouge and the heavy industrialization in Iberville.

TABLE 9 ASCENSION PARISH SUMMARY OF AIR POLLUTANT
EMISSIONS, 1968 (TONS/YEAR)

Source Category	Sulfur Oxides	Partic- ulates	Carbon Monoxide	Hydro- carbons	Nitrogen Oxides
Transportation					
Motor Vehicles	40	80	9,690	770	560
Other	160	70	40	80	160
Stationary Fuel Combustion					
Industrial	N	330	N	N	7,560
Commercial	N	N	N	N	20
Residential	N	10	N	N	40
Steam-Electric	0	0	N	N	0
Solid Waste					
Open Burning	20	290	1,580	550	200
Incineration	10	80	170	10	10
Industrial Processes	0	4,880	1,100	12,300	0
Evaporative Losses	--	--	--	640	--
TOTAL	230	5,740	12,580	14,350	8,550

N = Negligible

TABLE 10

IBERVILLE PARISH SUMMARY OF AIR POLLUTANT EMISSIONS
1968 (TONS/YEAR)

NOT REPRODUCIBLE

Category	Sulfur Oxides	Partic- ulates	Carbon Monoxide	Hydro- carbons	Nitrogen Oxides
Transportation					
Motor Vehicles	40	70	8,940	700	520
Other	340	150	70	160	330
Stationary Fuel Combustion					
Industrial	N	310	N	N	8,130
Commercial	N	N	N	N	20
Residential	N	10	N	N	40
Steam-Electric	10	220	N	N	5,640
Solid Waste					
Open Burning	10	250	1,360	490	170
Incineration	10	100	240	10	20
Industrial Processes	30,000	3,000	6,300	57,410	1,200
Evaporative Losses	--	--	--	610	--
TOTAL	30,410	4,110	16,910	59,380	16,070

N = Negligible

TABLE 11 EAST BATON ROUGE PARISH SUMMARY OF AIR POLLUTANT
EMISSIONS, 1968 (TONS/YEAR)

NOT REPRODUCIBLE

Source Category	Sulfur Oxides	Partic- ulates	Carbon Monoxide	Hydro- carbons	Nitrogen Oxides
Transportation					
Motor Vehicles	660	1,060	135,740	10,740	7,850
Other	1,270	710	7,100	1,980	1,690
Stationary Fuel Combustion					
Industrial	N	830	N	N	20,760
Commercial	N	30	N	N	160
Residential	N	50	N	N	330
Steam-Electric	N	100	N	N	2,730
Solid Waste					
Open Burning	160	2,520	13,400	4,710	1,720
Incineration	50	700	1,670	90	100
Industrial Processes	38,300	21,260	186,000	111,200	2,400
Evaporative Losses	--	--	--	8,640	--
TOTAL	40,440	27,280	343,910	137,360	37,740

N = Negligible

TABLE 12

WEST BATON ROUGE PARISH SUMMARY OF AIR POLLUTANT
EMISSIONS, 1968 (TONS/YEAR)

Source Category	Sulfur Oxides	Partic- ulates	Carbon Monoxide	Hydro- carbons	Nitrogen Oxides
Transportation					
Motor Vehicles	20	50	6,660	530	380
Other	520	240	120	250	500
Stationary Fuel Combustion					
Industrial	N	10	N	N	110
Commercial	N	N	N	N	10
Residential	N	N	N	N	20
Steam-Electric	0	0	0	0	0
Solid Waste					
Open Burning	10	100	540	200	70
Incineration	N	40	100	10	10
Industrial Processes	0	4,200	0	0	0
Evaporative Losses	--	--	--	430	--
TOTAL	550	4,640	7,420	1,420	1,100

N = Negligible

TABLE 13

ST. JAMES PARISH SUMMARY OF AIR POLLUTANT EMISSIONS
1968 (TONS/YEAR)

Source Category	Sulfur Oxides	Partic- ulates	Carbon Monoxide	Hydro- carbons	Nitrogen Oxides
Transportation					
Motor Vehicles	10	20	2,270	190	140
Other	340	150	70	160	330
Stationary Fuel Combustion					
Industrial	N	210	N	N	4,940
Commercial	N	N	N	N	10
Residential	N	N	N	N	20
Steam-Electric	0	0	0	0	0
Solid Waste					
Open Burning	10	140	720	250	90
Incineration	10	80	170	10	10
Industrial Processes	47,000	10,310	4,000	10,800	1,200
Evaporative Losses	--	--	--	180	--
TOTAL	47,370	10,910	7,230	11,590	6,740

N = Negligible

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